THE ELECTRICAL WORLD

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Steam Engines for Driving Dynamo-Electric Machines.

III.

THE BALL AUTOMATIC CUT-OFF ENGINE.

In the steam engines specially designed for driving dynamo-electric machines which we have described, the action of the regulating devices was found to be so delicate and prompt as to maintain the speed almost absolutely constant, the variation of speed between such engines when running with full load and when running empty being less than two per cent of the number of revolutions. It is undoubtedly because the centrifugal governor can be applied and can operate under more favorable conditions in engines of this class that such a close approach to absolute perfection of regulation is obtained. The fly weights being here attached to the balance-wheel or else to the driving-wheel, receive their motion directly from the crank shaft, whose speed is sufficient to insure centrifugal tendency, and they are instantly influenced by its every variation, which they feel without delay. At the same time they are intimately connected to the mechanism of the excentric which controls the supply of steam, and can thus change its range with ease and quickness in response to the slightest change in the speed. The requirement of constant and uniform speed—which is paramount to all others in electric lighting—is quite amply satisfied by a regulation of speed within the limits above stated, and the proof of the fact is the success realized and the reputation gained by one of these forms of engines in the last two years.

It may be argued, and with reason, that much of the effectiveness of the governing devices of the class just described, depends on the skill of adaptation displayed by the designer, for, as a matter of fact, all high speed engines do not regulate with the same precision. But the same may be said also of engines regulated by the old form of governor. Yet there is an important discrepancy between the results obtained with the two forms, for the first can compass variations equal to the whole load, without serious fluctuations in speed, while the latter, as we find it applied in slow speed engines, would permit serious fluctuations with variations of less than half the load, and would be more or less ineffective against variations equal to the whole load. The superiority of the high-speed engine in point of close regulation cannot be questioned, and to account for it we must concede that there are immediate advantages, as we intimate above, in the new mode of applying the centrifugal governor which becomes practicable with higher piston speed. This conclusion of course argues strongly in favor of the special adaptability of high-speed engines for driving dynamo-electric machines, for it bears directly on the most important factor of the problem—constant speed.

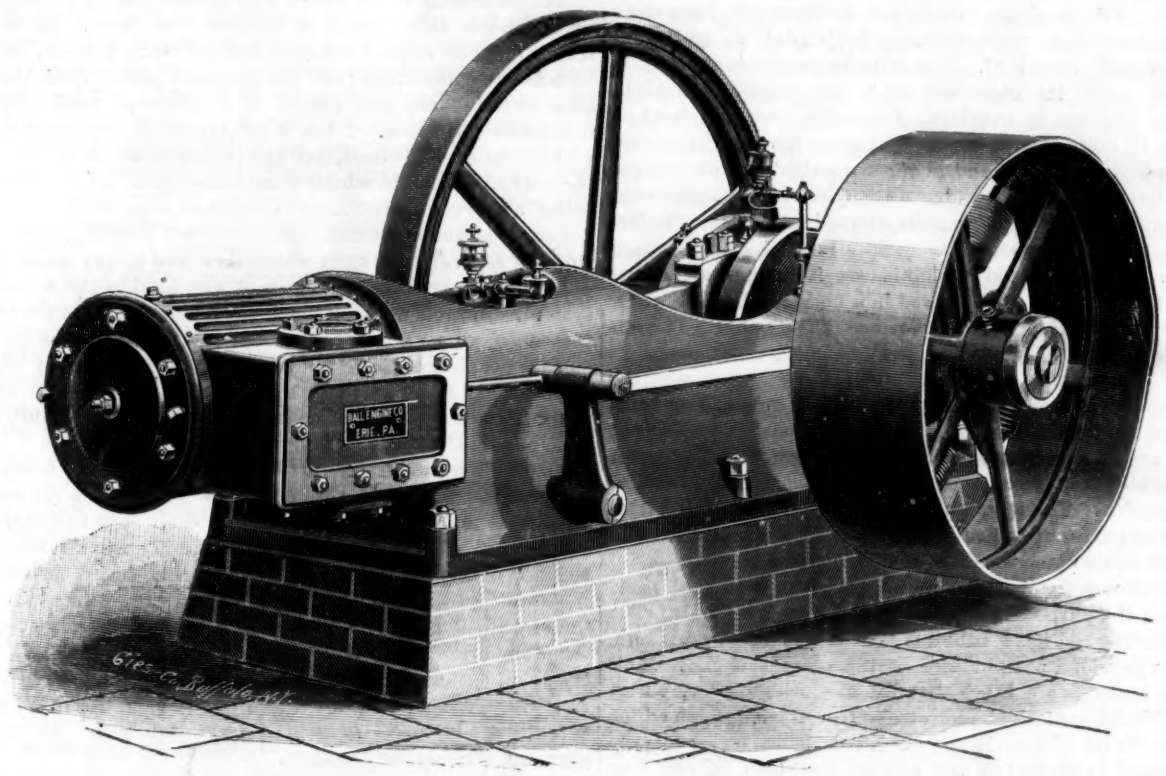

FIG. 1.—BALL AUTOMATIC CUT-OFF ENGINE—FRONT VIEW.

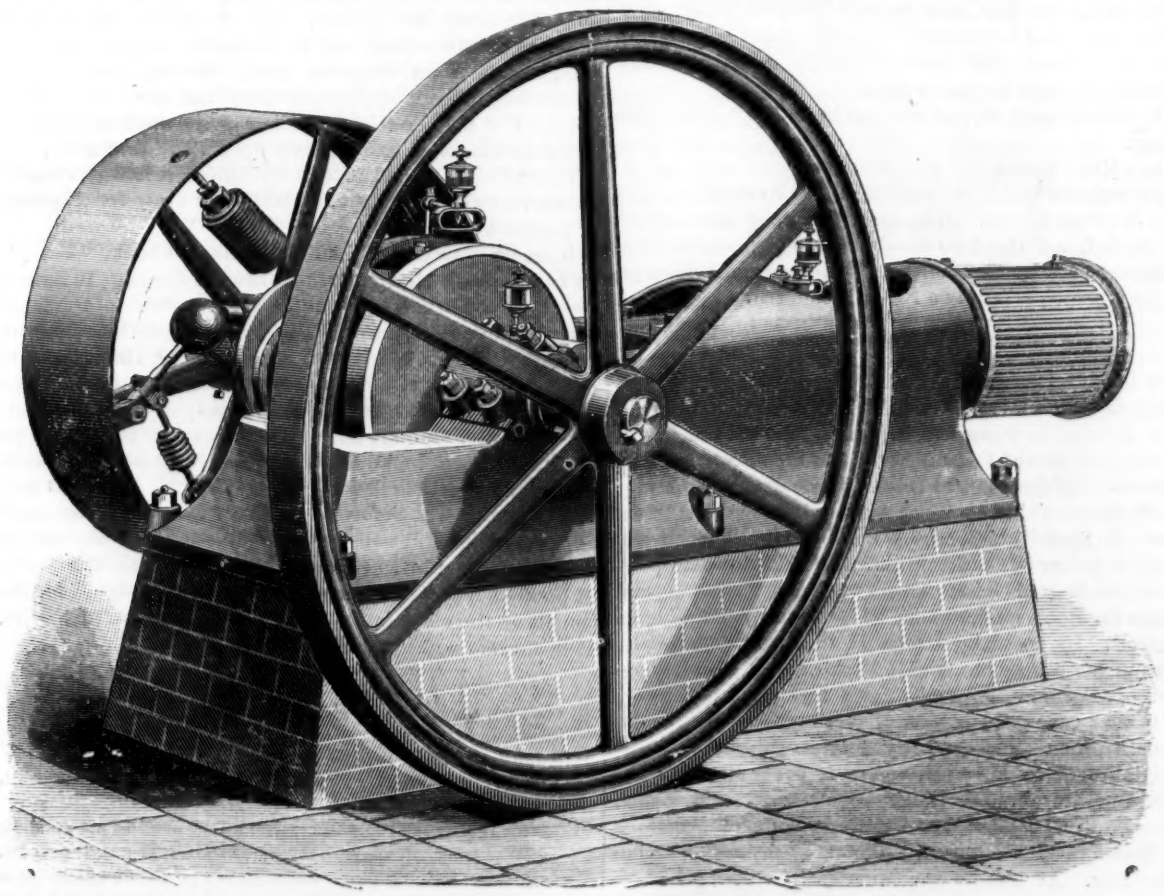

FIG. 2.—BALL AUTOMATIC CUT-OFF ENGINE—REAR VIEW.

The high-speed engine then—at least in its best forms—has arrived within reach of the much-coveted goal—absolutely perfect regulation. The small variation of two per cent. is all that remains as the margin for further improvement. The electric light engineer has every reason to be satisfied with such close regulation, though, of course, he would look upon a still nearer approach to perfection with favor. The competing designer and builder, on the contrary, is deeply interested in seeking to improve, and in striving to reduce the already small margin.

The question which naturally occurs here, therefore, is whether the results now obtainable with the best high-speed engines can be improved upon by greater perfection in the regulating devices or whether we have attained the limits of possible perfection; whether, indeed, further improvement is within the range of possibility. A brief analysis of the principle of regulation by which these results have been attained will assist us in answering this question.

This principle is the same which has always been used since it was first applied by Watt, namely, to let the speed regulate the supply of steam to the cylinder, by means of a device responding to centrifugal action. As long as the speed remains constant the centrifugal effect produced on the governing device remains the same and the supply of steam admitted into the cylinder at each stroke is unchanged. But let a variation of steam pressure or of load take place; it reacts on the speed and the change of centrifugal effect produced on the governing device causes the latter to readjust the supply of steam. If the variation was such as to increase the speed then the supply is diminished, but it is important to observe that the speed will not be reduced exactly to the same rate as before because this would only make the governor return to the position it just left, allowing the supply of steam to increase again with the effect of increasing the speed. A little reflection also shows that when the speed is lowered by increased load, the governor cannot bring it back to the same rate, for by the time this rate is reached the position of the governor itself is such that it admits less than the supply of steam necessary to do the work at this speed.

It is here that we find the theoretical explanation of the two per cent. variation found in the best high-speed engines. It has been reduced to this low value by careful construction which eliminates friction and other drawbacks to delicate action, and when we consider the fact that the defect has an inherent cause, which cannot be eliminated, this close regulation seems all the more wonderful, and it points to the conclusion that the limit has been reached, at least so far as purely centrifugal methods are concerned.

The defect which we have noted, however, is not the fundamental one. The centrifugal method of regulation is open to a yet graver objection in that it affords "the pound of cure rather than the ounce of prevention." It merely *corrects* or "cures" a variation, when once such a variation has asserted itself, instead of *anticipating* and "preventing" it, which should be the aim of a correct principle and method of regulation.

It operates by the *effect*, change of speed—which a variation of load produces, instead of being guided by the *variation of load itself*, which is the cause of the change of speed. The proper manner of counteracting changes of speed due to variations of load is evidently to let the regulating device *measure* this load even as a dynamometer would do, and to let it regulate the supply of steam accordingly so as to maintain the required speed. This is the

radical remedy which presents itself as the only alternative to inventors seeking to improve on the results already obtained. It has doubtless been thought of by many of the engineers and inventors who have studied the defects of the centrifugal governor, at various periods of the evolution of the steam engine; but its practical application is of very recent date. Mr. F. H. Ball, of Erie, Pa., appears to be the first who has reduced the idea to practice in the endeavor of obviating the defects inherent in the centrifugal principle of regulation. It is embodied and utilized successfully for the first time in his new automatic cut-off engine, the description of which, to which we now turn, will be very interesting in view of this very fact.

The design of this engine, shown in Figs. 1 and 2, aims at all the qualities which are desirable in a high speed engine. The bed is of that self-contained compact form which insures stiffness and strength with economy of floor space. The two pillow-blocks for the crank-shaft form a part of the bed and they are brought very close to each other, leaving only sufficient space between for the disc-crank. The bearings, which are made ample, have their caps placed at an angle from the horizontal, as in the engins already described. The cylinder, which is short compared with its diameter, as is the practice in high-speed engines, is overhung from the bed and held in place by bolts passing through a turned flange. This makes it readily detachable and at the same time permits free expansion. The crosshead has an ample wearing surface in the guides, which are carefully aligned with the cylinder. This wearing surface of the guides is ⊂-shaped on each side. The crosshead, which is cast in one piece, forms two slides, which are disposed in a horizontal plane carefully fitted to the ⊂-shaped surface of the guides. This ⊂-shaped form of guide is well calculated to maintain the alignment perfect, and the large wearing surfaces which it affords insures coolness during long runs. These guides are lubricated by means of visible feed-oilers. The top of the frame is cut away as if to leave room for these oilers, a web of metal being left at the front end of the guides. The purpose of this web is evidently to bind the two guides more firmly together. This gain in strength, which could safely be dispensed with, is at the expense of convenience, for it makes the access to the crosshead bearing for the purpose of taking up wear very difficult. The connecting rod has a babbited bearing at the crank end, but is provided with brasses at the crosshead end. Both of its bearings are lubricated by a movable oiler, which scrapes drops of oil at each stroke from a wick, upon which drips the oil of a stationary oiler, this device being exactly the same as applied to the engine described in our first article.

The excentric is also lubricated in the same manner as in that engine, namely, by means of a flattened funnel, which catches the oil dripping from a stationary oil-cup. One of the pulleys on the crank shaft is intended as a kind of fly wheel, the power being taken from the other pulley, which is loose on the crank shaft and receives its motion only through springs, which yield in proportion with the load, the relative motion being utilized so as to control the excentric, and thus vary the throw of the valve, which receives its motion from the excentric by an intermediate rocking arm, as shown in Fig. 1. ***

(TO BE CONTINUED.)

The Buffalo Electrical Society.

The Buffalo Electrical Society held its regular semi-monthly meeting on the evening of the 16th inst. J. W. Larish read a paper on the subject of "Telegraph Repeaters;" William Finn another on "Ohm's Law," which he illustrated with blackboard exercises. Both the gentlemen discused their subjects in an intelligent and comprehensive manner, which was no doubt beneficial to the members of the society present. Future meetings will be devoted to the introduction of advanced as well as elementary electrical subjects. The next meeting of the society will be held on the first Friday in March.

ELECTROGRAPHING ON SMOOTH SURFACES.—A Cleveland dispatch to the New York *Tribune* says that Edward W. Fell, of that city, after experimenting for two years, asserts that he has succeeded in perfecting an invention which takes absolutely permanent pictures upon any substance whatever having a smooth surface. This is done instantly by the action of electricity upon a sensitive coating, and at an expense not exceeding one cent per picture. A reporter, who called upon the inventor, was shown some photographs on pieces of wood, which were not only perfect in outline and finish, but possessed a peculiar softness not obtainable by any other process. "The importance of this discovery," said Mr. Fell, "and its varied uses, can hardly be estimated. It opens an entirely new field in the art of photography and will work a revolution in various branches of business into which it will enter more or less. None of the present processes are used, and it is not intended to interfere with the portrait work of the average photographer. The engraver upon wood, copper or shell need no longer consume time and patience in obtaining a defective counterpart of the object to be engraved; but instead can, at a trifling expense, obtain a beautiful photograph directly upon the wood or metal upon which the engraving is to be made. In the lithographer's art it will be invaluable. Instead of the slow, laborious and defective process now employed in transferring by hand, the article will be photographed directly upon the stone to be engraved, and the result will be a fine, complete, finished class of work, heretofore utterly unobtainable."

The Newark, N. J., Telephone Exchange.

Our readers will be interested in the subjoined extract from an interview had by a Newark, N. J., *News* reporter and the superintendent of the telephone exchange there:

"We have a system of our own," said Superintendent Jabez Fearey, "and are so well satisfied that it is unequaled by any other telephone exchange that we are willing and anxious to make the test at any time. We are always even up with the business and never get confused or mixed up. As soon as a subscriber wants another, the little drop on the annunciator, which is connected to the end of the wire on his circuit, falls, revealing the name of the person calling. His number, you see, is just above the drop. The attendant sticks that brass plug in the hole under the drop and gives it a turn, at the same time asking what number is wanted. He tells the boy who is at the desk the number of the caller and the number he asks for, and in two seconds the connection is made unless the party asked for is busy at that time. In case he is, the check with the number on is stuck upon a hook and is next in turn on that table. In the meantime others are coming in and the work goes on. As soon as the caller rings 'off' the plugs are pulled from the large switch-board and placed at the bottom, ready for immediate use again. I know of no other exchange in which the check is used, and the consequence is we are the only exchange in which there is no confusion, and the caller is never required to call more than once in case he is not supplied the first time. We have 537 circuits, a wire running separately to each subscriber, and to-day there is not a cross, a ground, or trouble of any kind in the whole system. In fact, we don't have one a day, and as soon as they do occur send men out at once to straighten them up. In case people who have the telephone do not use it by noon we call them up to see if the wire is all right, so as to fix it and save our customers all the trouble and annoyance possible.'

At the five small trunk tables, three local, one to the outlying towns and the other to New York, the boys sat with their mouths to the transmitter, their ears to the receiving tube, and each with one hand holding a rubber-handled brass plug. The boys at the switch-board answer Assistant Superintendent Marsh's call, "621 wants 342," the boy at the table on which the check has been placed turns the brass plug, which makes the connection with the small batteries supplied to each telephone, and the bells ring at the office of the caller and the person called. He listens until he hears them in conversation, pulls out the plug and is ready for the next.

"Here is the test that no other exchange in America would stand," said the Superintendent. "'Crans' Runyon, the Assistant City Auditor, wants thirty different persons, and if you will time us you will see how quickly he will be supplied." Mr. Marsh took down the thirty numbers asked for and then switched the Auditor's office on to each one after the other, waited until the business with each had been concluded, and finished in just twelve minutes. "That is the quickest time in which we ever did it," said Mr. Feary; "the average is about fifteen minutes. Mr. Runyon, at certain days, when they have certain parties to pay, we call it pay-day, goes through the same form. He thus saves sending messengers or postal cards, and clears up in a very short time business which under ordinary circumstances would require days."

"How many calls do you average in a day," asked the reporter.

"Over three thousand," was the reply.

The telephone was first introduced into Newark in 1879 by the Western Union. The Bell Company soon afterward started, and the two combined. This combination was brought out by the Domestic Telephone and Telegraph Company, which is purely a Newark concern.

Another Telegraph Company.

New telegraph companies are starting up daily in various sections of the country. One of the latest is the Michigan Postal Telegraph Company of which the subjoined account is given in the Detroit *Evening Journal*:

The new Michigan Postal Telegraph Company is purely a Michigan company, its incorporators being Albert Ives, Jr., who is President, George S. Farnsworth, Superintendent and Manager of Construction, who held the same position on the Mutual Union, Albert Ives, Sr., Treasurer, and William D. Robinson and Don M. Dickinson, all residents of Detroit. Its special purpose is to furnish competing telegraph facilities throughout Michigan, a thing neglected by the new companies heretofore organized, probably for the very good reason that they were not Michigan institutions. The company has already built a line through Toledo to Fostoria, where it connects with the Bankers & Merchants', Baltimore & Ohio, and Nickel Plate telegraph systems. At Toledo it connects with the New York Postal Telegraph, which is constantly extending its line. At Toledo the Michigan Company has received favorable franchises and much encouragement. It will soon open its office on the Toledo Board of Trade, and at connecting points with the three main lines named.

"If the company is promptly given the asked for accommodations here," said Messrs. Dickinson and Farnsworth to a reporter yesterday, "it will probably be able to open its offices here in about two weeks. The building of a line to Bay City and the Saginaw Valley will follow immediately the completion of the line to Detroit, and as soon as spring opens lines will be rapidly pushed in the interior of the State. We will serve Grand Rapids and towns along the Grand Rapids & Indiana Railroad by building a line to Kalamazoo and connecting there with the independent telegraph line which the Grand Rapids & Indiana road has always operated. We have done an almost unprecedented thing in building our line in mid-winter, and everything about it is first-class. The wire is of special manufacture, superior for its conductivity and strength. Our facilities for transacting business will be fully equal to those of the Western Union, and superior in some respects. We expect that our service will be more reliable and our business conducted in a more generous spirit."

"What facilities will you be able to offer the press?"

"First-class. We will be served by an associated press company now formed under contract with the great competing telegraph lines with which we are connected, and we are advised that we shall have cable service as soon as we are ready to open business. The New York Postal Telegraph Company, which has Mackay, the bonanza king, at its head, has commenced laying its great cable system, and when completed we shall have the advantage of that, besides the other cable service with which we will start."

"How will you sell your press news? Will it be monopolized by a few papers, as the Associated Press dispatches now are?"

"No. We shall sell our news to any and all papers that will pay for it. Our company, the Michigan Postal, was organized for the people. It is a kick against monopoly. Strong effort has been made to buy our stock—we have had offers of $2 for every $1 of it—but none of it has been sold; it is all held in Detroit and none of it will be allowed to go out; in fact, there is a written agreement among the members of the company, on which suit for damages can be brought if violated, that 'none of the stock is to be sold.'"

"Is there no danger that your line and the competing lines with which you connect will be secured by the Western Union?"

"Not a bit. The lines now competing are too vast and too valuable. Either one of the three lines with which we connect is larger than the Mutual Union was. There never before was one-tenth of the capital in competing lines that there is now. Besides, the existence of the Michigan Postal Company does not depend on that of our connecting lines. There is local business enough to support our company. Michigan does more telegraphing, in proportion to its population, than any other State in the Union except New York. We have every assurance of a good custom among all classes here."

Patents on Inventions.

Patent law bears the reputation of being very intricate and not easily understood by laymen. Many persons have a general knowledge of the principles that govern the protection of patents, designs, trademarks and copyrights, but they often find their powers of comprehension failing to grasp the reason why certain decisions have been made on a given point in the patent office or the law courts. Patent lawyers themselves must be hardworking and in constant practice or their information soon becomes stale, obsolete and useless, when they are likely to do a client far more harm than good. If it be true that not a half of the applications filed at the Patent office are properly drawn and that about one in every four is so bad as to be worthless, it is very evident that a vast amount of money is thrown away for the lack of a little knowledge.

It seems to us that in issuing the elegant book, "Patents on Inventions," Messrs. Burke, Fraser & Connett, 10 Spruce street, New York, have done a great service to the large body of inventors, capitalists and lawyers interested in patents. The book is the first volume of the quarterly patent law review, written, edited and published by this well-known firm, and contains a variety of most interesting and valuable papers. Its information is precise, its explanations are lucid, and its record of passing events is full. Every article leaves the reader of it a good deal wiser than he was before he began it, and we can only hope that the firm will continue this work. We notice some very fine illustrations scattered through the book. In point of fact "Patents on Inventions" is designed for the benefit of the clients of the firm, but it will, on its merits, have a much wider circulation than even that implies.

CABLES BROKEN.—A special dispatch from Newport, R. I., of the 8th inst. to the Boston *Herald* says: The Block Island cable is broken, and the signal station at that place is obliged to receive and forward its reports by mail. The cable has been useless for several weeks. The cable connecting Newport with Jamestown is also broken.

SOUND VIBRATIONS PHOTOGRAPHED.—Recent experiments show the photography of sound vibrations to be a practical process. A small, thin platinum plate was attached perpendicularly to a thin iron plate, which, as in the telephone or phonograph, was fixed on a wall piece and vibrated to sound. With a solar microscope an image of the platinum plate was focussed on a screen, after which a prepared photographic plate was quickly moved across, in the plane of the screen, by a strong spring, while the mouthpiece was spoken to. A bounding line between light and shadow was thus obtained on the prepared plate, forming a curve closely corresponding to the sonorous vibrations—simple curves for vowels, complicated ones for consonants.

Montreal's Winter Carnival—Arc Lamp Illuminations.

BY JAMES CHEESMAN.

It is not given to every one to witness such a sight as was seen in Montreal last week. From the fourth to the ninth inst. the city and its large influx of visitors were almost entirely given up to the pursuit of pleasures incident to the occasion. In the central part of the city is a large open space named Dominion square, on which was erected a most beautiful structure in the style of a mediæval castle, but the building material was ice and the cement water, which in a few seconds was frozen so solid as to make fracture impossible. The "Ice Palace," as this edifice was named, stood in the centre of one-half of the Dominion square, became the centre of attraction and the rendezvous of the clubs and visitors who participated in the sports which formed part of the carnival programme.

The sports were skating, snow-shoeing, tobogganing, sleighing, curling, trotting and a sham fight between the various snow-shoe clubs, with fire-works. A lengthy notice of any of these would be entirely out of place in this journal, and we, therefore, leave the field to our contemporaries.

The Ice Palace was built of 10,000 solid blocks cut from the St. Lawrence, 40 × 20 inches, and no other material was used in the work, which cost $3,200. The building faced Dorchester street, one of the principal avenues of the city, had a frontage of 160 ft., and was 65 ft. deep. In the centre was the main tower, reaching 76 ft. high, the base of which was 40 ft.; then came a second section, which was square and reversed on the first to a height of 15 ft., after this a third section of octagonal form surmounted the whole for another 21 ft., making a majestic pile of near 80 ft. At each of three angles was a tower, the largest measuring forty feet, the next two twenty-nine feet each, and the wall twenty-one all round, but castellated. In some of the windows were placed thin sheets of ice of about two inches thick, from which were displayed the colors that helped to vary the otherwise unbroken mass of clear crystal. The palace was lighted by the arc lamps of the Phœnix Electrical Company of Montreal. Seventeen lamps of the ordinary street size (estimated 2,000 c. p.) were used to illuminate. The company was fortunate in obtaining such a contract in the face of the fact that others had tendered to light the building. The rival company of Montreal wished to light it without charge, offering the service as a contribution to the carnival fund, but this offer was not made till the contract had been awarded. When the current was sent through the circuit the display of light through the walls of the palace formed a spectacle superbly beautiful. The light was steady and gave very uniform results throughout the eight days during which the palace was lighted. The committee expressed themselves entirely satisfied with the performance of the plant, while the public were exceedingly well pleased. At one time lighting by incandescent lamps was talked of, for this company works both arc and incandescent systems. The idea was abandoned in favor of the arc lamps, and these were put in and the current was supplied from two ten-light machines coupled to form one circuit. During the week the company's plant was watched by many practical men, who expressed much satisfaction with the results. There was but little heat and no sparking on the commutators, nor was there a hitch during the entire week, notwithstanding the machines worked were new and had not been tested before. The power used to operate these machines was supplied by an engine of local make whose cylinder measured 10 × 10 inches. Consumption of power was estimated at 13 H. P. Current supplied measured 15 ampères, and the difference of potential between the terminals of the lamps was 35 volts.

The company, although young, pride themselves on having what they claim to be a very economical system, which is said to be attested by the uniform satisfaction which it has given wherever tried, not one plant having been removed. They have furnished the Dominion Bridge Company with arc and incandescent plants, each of the two large sugar refineries, boot and shoe works, the Magog Cotton Mills, St. Henri Carriage Factory, and many others. They are kept busy supplying orders, which extend far into the present year. The general form of their machine presents a picture of great simplicity, compactness and beauty. Its efficiency, fine workmanship, and the general excellence of its details are remarked by all.

Before noticing the features of illumination presented by the other company, the pyrotechnic display at the Ice Palace should have some attention. On Wednesday there was a general civic holiday, and at eight o'clock in the evening the sham fight between the snow-shoers took place—one party attacking and the other defending the keep till capitulation, which came thirty minutes after a perfect bombardment of the Ice Palace with rockets which attacked it from all quarters. Never was a more brilliant display made in so short a space of time and on so limited an area. Every conceivable color was there in the most bewildering variety, and all the most fantastic forms were assumed by the explosives when projected high up in the air. Nearly 2,000 men took part in the attack and defense. The spectators were nearly mad with delight and excitement as missiles were hurled thick and fast from one side to the other, filling the air with a complete haze of smoke. Those who have read some of the thrilling stories told by war correspondents in the columns of the daily press, can but conjecture what the storming of the Ice Palace was like. Not the graphic illustrations of the practiced pens of the world-renowned correspondents could succeed in making the reader realize how impressive, bewitching and captivating was that never-to-be-forgotten night. After the capitulation, the snow-shoers, each provided with a torch, fell into line and marched in procession over Mount Royal, a mountain from which the city takes its name. The thin line of men clad in the garb of blanket suits, and variegated colored *tuque* (cap) and stockings, exhibited a rare spectacle. They made one unbroken sheet of fire of more than one mile long, winding up and round the terraces which climb the mountain side.

The American Electric Illuminating Company, although only recently established in this city, has made good its claim to be considered a prominent feature of the carnival. They furnished two circuits of fifty lights each, which were distributed among hotels, skating rinks, and on the second half of Dominion Square. In this, the northern half of the square, opposite the Ice Palace, was erected a high pole on which were mounted seven of the arc lamps of the Thomson-Houston system, which is employed by this company. The machines and lamps used by this company have been before the American public some time, and have long since won for it a reputation as a first-class public illuminating company. As usual their light gave the steady and unfaltering results which have distinguished it wherever it has been placed. On each side of their circuits they have one 28 and two 12-light machines, one to supply the hotels, skating rinks and Dominion Square, and the other to light the streets and station. Inside some of the rinks their light appeared at a disadvantage, as part of the building was lighted by gas, but outside the rinks and hotels it beamed forth its cheering rays. The company make a great claim for the efficiency of their governor, a point of much importance when a machine is running under varying conditions of power. Their plant was run with an expenditure of about three-quarters of a horse power, a current of ten ampères, and a consumption of electromotive force of forty-five volts. In a public test which they are pleased to quote, a most interesting showing is made, under Prof. R. H. Thurston's superintendence, as already described in THE ELECTRICAL WORLD.

The company has displayed much energy during the year just closed, having opened and equipped no less than ten stations with an aggregate of 2,475 lamps. The wire used on their circuits is the No. 4 B S gauge of Holmes, Booth & Hayden's fire-proof make. In future it should certainly be the aim of the Carnival Committee to illuminate with incandescent lamps. In place of the oil lamps and torches now used on the toboggan hills it would surely be worth the expense to one club, and worthy the attention of one of these companies to light the slides of say the prominently located *Tuque Bleue* Club. The pretty sight of a circuit of fifty lamps of sixteen to twenty candle power each would add immensely to the attraction and cheerfulness of the slide, more especially on nights when the moon hides herself away.

Cedar Telegraph Poles.

Among the industries of which Michigan has an almost complete monopoly may be classed the business of getting out cedar timber, especially cedar telegraph poles. The cedar trade, as an industry of any considerable importance, dates back scarcely more than a dozen years. In 1871 the firm of Brownlee & Co. was organized at Detroit, Mich., for the purpose of dealing in cedar timber exclusively. From a small beginning the business has grown until the firm now give employment during the winter to about 150 men and a large number of teams. The demand for cedar as a material for telegraph poles is chiefly due to its remarkable durability.

When telegraph lines were first built in this country little attention was paid to the kind of wood used for poles—tamarack, oak, elm, ash, in fact, any stick of timber that was long enough was thought sufficiently good for a telegraph pole. But the telegraph and railroad companies were not long in finding out the advantages of cedar, and cedar poles are now almost universally used for telegraph and telephone lines. As an instance of the lasting qualities of this timber, it is stated that poles set by the Michigan Southern Railroad Company, in 1856, on the line between Toledo and Elkhart, when taken up in 1873 to be replaced by larger ones, were found so little decayed as to warrant resetting, and these poles are now doing duty between Jonesville and Lansing.

Other "strong points" of cedar are its light weight and its softness. The lightness of the wood when seasoned reduces the cost of transportation to a minimum, while its softness makes the poles safe and easy for the linemen to climb.

The northern counties of Michigan are the principal source of supply for cedar, although northeastern Wisconsin furnishes a small amount. Michigan puts on the market more cedar timber than all the other States taken together.

The work of getting out cedar poles is one that presents few attractions. The cedar grows in swamps so dense that one cannot see more than a few feet into it, and so wet that the timber can be worked only when the swamps are frozen. Moreover, in the winter time the branches are laden with snow, which constantly falls down upon the workmen and keeps them wet. But the cedar choppers, like the men in other branches of the lumbering trade, are wonderfully hardy, and seem very little disturbed by their cold shower baths from the tree tops. The men are mainly Canadians, Germans and Americans, and a very careless, happy-go-lucky sort of life they lead in their rough, moss-chinked cabins of cedar logs. The beds are generally pine bunks filled with hemlock boughs and covered with a blanket or two. A bag stuffed with hay serves the lumberman for a "downy" pillow. Sitting up in these bunks, with a roaring fire in the huge stove in the middle of the room, the men spend their evenings in singing rollicking songs and telling stories of doubtful reputation until the warmth of the fire and their own weariness puts them to sleep.

But it must not be supposed that all the telegraph poles brought to market are gotten out in these camps. On the contrary, many, perhaps even the greatest portion, of the poles are cut by settlers on their own land and sold to agents of the large city dealers. The process of preparing the timber for market is a brief one. When the tree is felled the chopper "sizes it up" and cuts it into as long a pole as the tree will make, the sizes ranging from 25 to 65 feet in length and from 4 to 7 inches in diameter at the top. The tree is then closely trimmed and the knots cut smooth. Lastly the bark is peeled off with a large drawknife and the pole is ready to be hauled to the "skids" by the railroad track, or to the lake shore, according as the timber is to be shipped by rail or vessel.

The market for Michigan cedar is a very extended one. Messrs. Brownlee & Co., who are the pioneers in the cedar business in Michigan, have shipped to New York, Pennsylvania, Kentucky, Kansas, Nebraska and the Indian Territory, although, of course, the bulk of the trade is nearer home—with Ohio, Indiana, Illinois, Missouri and Iowa.

A Government Telegraph.

To the Editor of The Electrical World:

SIR: In your paper of the 9th inst. there appears a communication from W. R. A., criticising mine which you published in a previous issue. I find a great deal of the spread-eagle argument is offered the fraternity, with the object, I suppose, of shelving my attempt at calling the attention of the operators of America to a possible and better future for them. The idea that the average American cannot brook the thought of entering a service for a fixed term—say seven years—or "for life," will, I doubt not, receive the sincere approbation of many, but it is no *argument* to offer; and as a matter of opinion, I would qualify it as ordinary buncombe. I have met with a large number of our guild who have been life-long believers in W. R. A.'s conclusions, but their present status would warrant me in making a comparison of how much better off they might have been to-day had they enjoyed the sort of service I am solicitous of introducing.

I am willing to allow the rest of my critic's remarks to remain unanswered. Your readers will determine their merits. I would only ask W. R. A. if he has entertained the thought of what is to become of a large percentage of our fellow-telegraphers whose life has been devoted to the business? Will any existing corporation treat them as honored employés and care for them in their declining years? And what can the operator of thirty years' steady service at the key be expected to turn his hand to when his employers say: "You must give way to a younger and better man for our interests?" I indulge in the hope that not only my esteemed opponent, but a great many of your readers may see the true drift of my advocacy of a government telegraph, and kindly give it a fair consideration. It must be obvious that the subject might be enlarged upon, perhaps, advantageously, and may be that without further elucidation a portion of our fellow-workers will insist upon opposing it out of pure obstinacy—or whatever you may choose to call it—but to one who will try and comprehend the bearings of my project, I think sufficient has been said. It is not a subject that any company will entertain! No doubt every corporation in the land would feel offended at any of its employés giving a moment's thought even to my penwork. But, thanks to your columns, we can give an occasional notice of our sense of justice. SA.

NEW YORK, Feb., 1884.

Telephone Rights in Brazil.

To the Editor of The Electrical World:

SIR: The following important cablegram has been received by this company from Rio de Janerio, Brazil:

"Supreme Court reverses decision of district judge and confirms 'Bell' patents for Brazil."

This decision settles the question, and gives our company the same monopoly in Brazil which the American Bell Co. enjoys in the United States.

Telephones or transmitters sent to Brazil since July last, or hereafter, will be confiscated and the consignees sued for infringement of Brazilian patent, and shipper here will be sued for infringement of U. S. patent. This company is the sole authorized exporter to South America.

JAS. H. HOWARD.

TROPICAL AM. TELEPHONE CO., Boston, Mass., Feb. 18.

THE
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Articles in the preparation of which he has assisted, and the views and statements in which he therefore indorses, are marked, **.

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NEW YORK, FEBRUARY 23, 1884.

AMENDING THE PATENT LAW.

At the time the decision was rendered by Judge Blatchford last year in the suit of the Gramme Electrical Company against the Arnoux & Hochhausen Electrical Company, for the infringement of the Gramme patent, we said that though the decision against the Gramme Company was not cause for weeping, the law under which it was rendered seemed to us unjust. Judge Blatchford ruled that as the Austrian Gramme patent had expired in 1880, the United States patent must under the provisions of section 4,887 of the Revised Statutes have expired on that date also, although it had been granted, as usual, for seventeen years. Our readers who wish to refresh their memories with regard to that case and the later Siemens-Alteneck case, which is not unlike, are referred to numbers 1 and 3 of our last volume.

To state briefly the point involved in the Gramme case: If an invention has been patented abroad before the application for the United States patent is filed, the term of the U. S. patent has been limited by the term of the foreign patent; and it has also been decided that the limitation applies even if the patent has been granted abroad after the application has been made for the patent in this country. Now, however, this obvious injustice is met by a bill which will, we hope, become law. It has already been introduced in the U. S. Senate by Mr. Platt, of Connecticut, and has passed that body. If we are correctly informed, its provisions are these: No patent shall hereafter be declared invalid, nor shall any inventor be debarred from obtaining a patent on an invention in the United States, by reason of its having been first patented abroad, unless the same has been introduced into public use in the United States for more than two years prior to the application; but every patent hereafter granted which has, prior to the filing of application for it, been patented in a foreign country, shall expire 17 years from the date of the foreign patent, but in no case shall it exceed 17 years, and the American application must be filed within two years from the date of the foreign patent. A special clause provides that no patent heretofore granted shall, however, be in any way revived, prolonged or extended because of this bill.

This would, as Mr. Platt explained, secure a larger measure of justice and reward to the inventor, and in the long run benefit the public. As matters go the patents thus dealt with are now subject to the varying limitations imposed by foreign patent laws. That such should be the case is certainly not the wish of the public. The effect is often, as has been well said, to punish a man for patenting his inventions abroad. Mr. Platt, in introducing the bill, stated that pressure had been brought to bear on the committee to make the measure retrospective, applying to patents that had already expired by reason of the present unfair working of the law; but the committee had decided to let the past alone. There are many persons who would have desired to see repaired the wrong done by the premature expiration of a patent, but it is likely that those who have entered upon a larger liberty by reason of that expiration—for instance, the men whose punishment the Gramme Company sought—will not complain of the bill as it stands.

DEATH OF COUNT DU MONCEL.

Electricians and physicists in this country were much surprised and pained to hear on the 19th inst. of the death of the Vicomte Theodore Achille Louis Du Moncel. It is safe to say that no writer on electrical subjects has been better known or better liked than he, and his loss will be widely felt in scientific circles.

It is not a little remarkable that in spite of the eminent rank of the Count Du Moncel, both as a writer and an investigator, his death should have been passed over so lightly by the daily papers. As far as we have been able to observe, none of the New York papers gave any account of his career when his death was announced, but this again may be due to the fact that the ordinary biographical dictionaries have strangely overlooked the talented Frenchman altogether.

According to the data at our command, Count Du Moncel was born at Paris on March 6, 1821. He received a liberal education, and soon showed a strong inclination for physical studies and great skill in their popular literary treatment. His first efforts as a writer date back as early as 1846, when, having treated of mathematical perspective, he traveled in Europe, making observations for artistic and archæological purposes, and wrote a work entitled *From Venice to Constantinople*. He then gave himself up to the physical branches of knowledge, and from 1855 down to the present month he has been a most voluminous writer on electricity and magnetism. To his numerous books must be added hundreds of articles and memoirs in the *Comptes Rendus* of the Academie des Sciences, *La Science*, *Le Cosmos*, *L'Ami des Sciences*, *L'Illustration*, and latterly *La Lumiere Electrique*, which, if we mistake not, he founded, and in which his contributions have always had a conspicuous place. Moreover, he is credited with having been the inventor of no fewer than thirty electrical devices and improvements in existing apparatus. We may mention four of his works as familiar to American readers—his *Elements of Construction for Electro-magnets; Electric Lighting; The Telephone, The Microphone and the Phonograph*, and *Electricity as a Motive Power*. All these and his other works amply repay careful perusal. His style was good, and with a thorough grasp of principles he combined the ability to make others see what he saw.

Count Du Moncel was a member of the French Institute, was made an officer of the Legion of Honor in 1866, and became a *membre libre* of the Academy of Sciences in 1874. He was also associated with a great many other French and foreign learned societies.

THE TELEGRAPHIC OUTLOOK.

It is now generally understood that the advocates of postal telegraphy have abandoned all hope of passing a bill for that purpose this session. Some weeks have gone by since we predicted that such would be the result of the strenuous efforts made. The U. S. Senate committee has found out, as we expected, that it cannot swallow all the evidence given to it, and cannot digest what it does swallow. Senator Hill is credited with the remark: "The committee find great difficulty in securing the knowledge they desire from the Western Union Telegraph Company. The latter is naturally indisposed to disclose its internal affairs, and dodges and evades inquiries of every sort. We have, however, ascertained one thing, and that is that the Western Union company owns and operates but few of the lines it controls, the remainder being leased or operated under contract. Of their 13,000 offices they do not operate over 4,000." It is said that probably the Presidents or other officers of telegraph companies will be asked to answer, under oath, specific questions designed to get at facts. The conflicting statements already before the committee have left it in a bemuddled condition, and it is anxious to obtain, if possible, a safe basis of fact before it recommends any legislation.

The recent advance in Western Union stock may be due in a measure to the fact that the present failure of schemes for government monopoly of the telegraph is well ascertained. It is also partly due, perhaps, to the litigation in which the Western Union Company seeks to involve its strongest and most formidable rival. The circumstances connected with the suits are given in our columns this week, and it will be seen that while in one case the property at stake is the whole line of telegraph between Baltimore and Wheeling, along the Baltimore & Ohio Railroad, in the other case relating to the control of the "Nickel Plate" telegraph lines, an injunction has already been served on the officers of the National Telegraph Company and of the Baltimore & Ohio Telegraph Company, restraining them from the use of the lines pending a hearing on the 26th inst. The object of this litigation appears to be pretty plain, and it remains to be discovered what amount of fight and endurance there is in the Baltimore & Ohio Company under its new management. The latest advices, in the shape of a dispatch from Cleveland, O., are that the Baltimore & Ohio Company has in its turn obtained an injunction securing to it temporarily the use of a certain portion of its recently-acquired National wires.

ELECTRICITY IN AGRICULTURE.

In reply to the question, "Will electricity ever be as useful to the farmer as to the manufacturer?" one of the most distinguished electricians of this country says, very guardedly: "I think not—at least not soon—though it may be." So far the developments of electricity as applied directly to agriculture are few, and there is justification in that fact for the safe and oracular utterance we have quoted. It would not be well to expect a revolution in agricultural methods on the strength of the plowing at the sugar plantation at Sermaize, France, in 1879, or of the use of electricity on his farm in England by the late Sir William Siemens, or of the forcing of vegetation by the influence of the electric light. These must be looked upon as exhibitional chiefly. But it is not in vain that the distance beckons, and every little point gained, every achievement, is a new departure and a new base of operations. The way in which one use suggests another has lately been shown in Russia. It is related in our European exchanges that certain work was performed a few months ago on the banks of the Dnieper, a river in Russia, with the aid of the electric light, at night. The rays of the light attracted millions upon millions of moths, beetles and other insects, and it was necessary to stop work often and destroy them before the light could be of any avail. This incident has suggested the employment of the light as a cure for nocturnal insects prejudicial to agriculture, and the experiments in that direction will be made this spring. Should success attend the experiments, American farmers may not be slow to improve on the idea. We note, by the way, that the workmen on the Dnieper soon found out for themselves the attractive influence of the light on fish, and fared accordingly.

A RIGHT TO USE THE HIGHWAYS.

The Supreme Judicial Court of Massachusetts has rendered an important decision on a suit brought to enjoin the select men of Brookline from giving permission to the American Rapid Telegraph Company, under a public statute, to construct a line of telegraph on certain highways in that place. The objection raised was that the statute itself was unconstitutional. It is held by the Court that the use of a portion of the highway for the poles and wires of a company formed under the laws of the State, for the transmission of intelligence by electricity, and subject to the supervision of the local authorities, is a public use of the kind for which the land was originally taken. In other words, when the land was acquired for a highway, it was not intended to limit the public uses of it to the vehicles then known, or to the methods then in vogue of transmitting intelligence or conveying property; and the use of the highway for telegraph lines ranks with its use for gas and water-pipes and horse-car tracks, as a new way of exercising the old public easement. All such methods of use must be deemed to have been paid for when the land was taken and the road laid out. But no right is given to telegraph corporations to use the highways at their own sweet will, or to compel the authorities to give them locations as desired.

THE HAVOC OF THE STORM.

The daily papers continue to be filled with most distressing accounts of the devastation of large portions of Ohio and other States by flood and storm. The whole of the wasted area may be but a trifling proportion of the country, but it is sufficiently extensive to be the home of hundreds of thousands of industrious people. A great many miles of telegraph wires have been carried away by the waters, and many miles lie submerged. Wind storms have also considerably deranged the service, not only in Ohio, but in Georgia. It is said that similar storms in France and Germany during January have convinced the authorities in those countries that in order to avoid the loss or interruption of the telegraph and telephone service the wires must be put under ground. The same inference could hardly be drawn from the effect of the floods and storms here, although the damage done may point to the necessity of using stronger poles. One novel use of the poles ought, we think, to plead for them. Portsmouth, Ohio, has been entirely under water. Over 100 houses have floated away, but about 200 are anchored to the telegraph poles and trees. Probably it will be hard to convince the inhabitants of at least one Ohio town that poles are a nuisance and ought to be abolished.

MR. BATES BUSY.

In addition to the many cares that fall upon him in the performance of his new duties as President of the Baltimore & Ohio Telegraph Company, Mr. Bates has no trifling worry in the various reports that are circulated about him and his intentions. Up to the present time, his denials, contradictions or refutations have averaged about one per day ever since he left the Western Union Company, and it

must be said that he has borne the usual penalties of exalted position with much dignity and manliness.

One of the morning papers of this city recently published an article highly derogatory to Mr. Bates' character as an official of the Western Union Company. Mr. Bates appealed to Dr. Norvin Green for a vindication, and that gentleman in his reply said: "No officer of the company believed that anything connected with the transaction reflected on your honor or business integrity. * * Nothing in the circumstances abated our confidence in you, as your subsequent employment in a higher and more responsible position evidenced." The refutation or exoneration could not be stronger, and we are glad to see that Mr. Bates has obtained it in so complimentary a shape. As to the light gossip referred to by us recently in "Scraps of Inside History," Mr. Bates informs us that there is no foundation for it whatever. The lovers of "a good story" are thus deprived of one choice tid-bit.

Electric Lamps and Regulators.*

BY DR. N. S. KEITH.

(*Continued from page* 51.)

I have not presented the several diagrams in the exact chronological order of the invention or presentation to the public, of the lamps they are intended to illustrate; but have, rather, brought them to view somewhat in the order of the evolution of the art. Some experimenters were at various periods a little ahead of their times; or, better, ahead of the development of the arts upon which the success of electric lighting depends as much, at least, as upon the lamp. They were also in advance of the public desire for light.

These various causes combined prevented the use of the

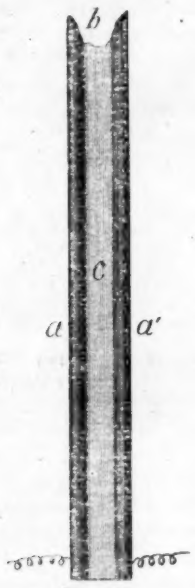


FIG. 15.

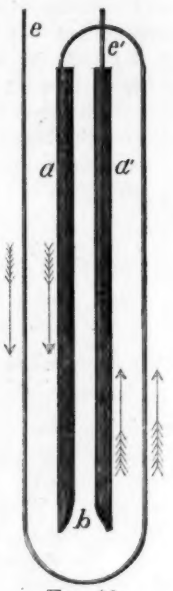


FIG. 16.

practicable lamps of the day, such as Serrin's, until after the invention of the Gramme dynamo had made possible a cheaper and more reliable source of electricity. Electric lights produced by Gramme dynamos and Serrin lamps were exhibited; but it was not until after Jablochkoff produced his famous electric candle that the public's attention was called to the subject in 1875 and 1876. At the Centennial Exhibition there was a very small exhibition of electric lights and of dynamo machines. The Société Generale d' Electricité of France exhibited some Gramme dynamos, a Serrin lamp and a hand lamp.

The firm of Wallace & Sons, of Ansonia, Conn., exhibited some Gramme machines and a lamp or two. These two exhibits comprised all in that line. But the matter shortly after took practical shape in France by reason of the production in Paris of the Jablochkoff candle. Fig. 15 shows one of these candles. a and a' are the two carbons, c is difficultly fusible material, like plaster of Paris, between the carbons, and b is the place where the electric arc is formed and the light produced. This material c serves three purposes—one to keep the carbons the proper distance apart; another, to keep the arc at near the upper ends of the carbons so that it moves downward only as fast as the fusion of the material near the arc makes way for it to move; and, third, to furnish a material at the arc which by its presence or chemical action modifies the quality and color of the light.

The scheme is a very attractive one, viz.: to place the carbons at the desired length of arc apart, once for all, and so avoid the use of lamps and their perplexing mechanisms. But practice has shown that the accessory mechanisms, made necessary by the short time which the candle lasts, for automatically shifting the current from one to another during the time light is needed from them, are at least as expensive and difficult of management as those of any point-to-point system.

At first one of the pair of carbons was made twice the cross-section of the other so as to compensate for the unequal combustion of the positive and negative. But this construction was soon abandoned, because carbons could not be practically produced which preserved the theoretical relation. Then both carbons were made alike

* Lecture delivered before the New York Electrical Society, Jan. 16, 1884.

and currents of electricity were used which rapidly alternated in direction so that the carbons were alternately positive and negative. This insured equal combustion. Before the time of the Jablochkoff candles electric-light carbons were made square in cross-section. These were cylindrical; and that form has been universally adopted.

The larger part of the rays of light from the arc of the Jablochkoff candle are thrown upward, instead of downward where they are of more utility. The candle could not be practically reversed, because the arc would rapidly travel toward the other end of the candle without consuming it.

Jamin invented a candle which avoided the use of the

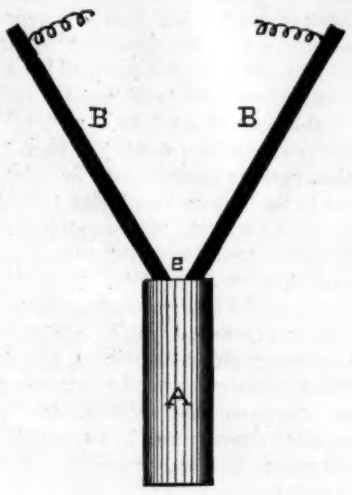


FIG. 17.

fusible insulating material of the Jablochkoff candle, and which could be practically reversed so as to have the light constantly at the lower end. Fig. 16 is a diagram of the Jamin candle. a and a' are the two carbons, b the place of the arc, e e' the electric conductors to and from the candle, and the arrows show the relative directions of the alternating currents used in the conductors and carbons. The principle is based upon the attraction which like currents exert upon each other and upon the materials and current in the arc. When the currents in the conductors and the adjacent carbons have like directions, the light is moved toward one end of the carbons, and toward the other end when the currents have unlike direction. In practice, the conductors are passed four or more times around the length of the carbons, after the manner shown in the figure.

We will consider a few diagrams illustrating some departures from the regular course before we take up the more modern lamps in practical use at the present time.

Fig. 17 illustrates one of the lamps invented by Staite early in his efforts. A is a block of some non-conducting, refractory material like lime or fire-clay; and B B are two carbon pencils which rest in an inclined position on the block. The arc is manually formed at e, across the space shown. The heat communicated to the block makes it glow at its upper end, and the light emitted is soft, though not brilliant. This is the prototype of the Soleil lamp. Its light rays proceed upward. In the Soleil lamp the carbon pencils are passed through holes in a refractory block and the arc is produced at the lower end of the block where the carbon pencils barely protrude their lower ends. This lamp has been lately modified, but need not be described in this connection.

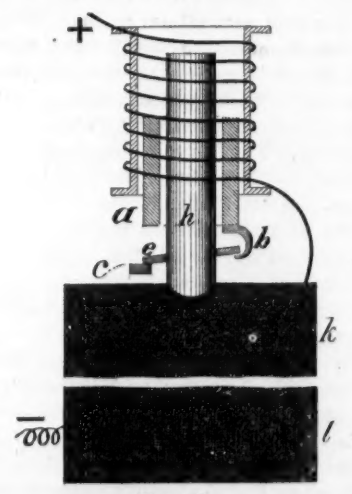


FIG. 18.

Fig. 18 is a diagram of the Wallace plate-carbon lamp. It was designed to avoid the necessary frequent replacement of the ordinary carbon pencils. k and l are two carbon plates say of ¼ to ½ inch in thickness, and any desired length and width. h is a metal rod, to which the upper carbon plate is directly or indirectly fastened. a is a tubular iron-core to the solenoid; the rod h freely passes through this core as shown; b is a hook attached to the core and acts on one side of the metal washer-clamp e; c is a fixed stop against which the clamp e may rest when necessary. When no current is flowing the carbons rest edge to edge. But when current is started the solenoid is energized, the core is attracted upward and moves with it, by means of the hook, the clamp and the rod with its attached carbon. The arc is formed at the points on the edges of the two carbons which were last in contact; and it moves gradually along the edges in the direction of the least width of space between the carbons. When combustion has increased the width of separation, the feed movement takes place by the weakening of the current due to the increased length of arc, the consequent decrease in attractive force of the solenoid and the lowering of core, hook and clamp until the edge of the clamp rests on the stop c, and assumes an approximately horizontal position, so that the rod slips through the clamp; all after the manner which we have considered in the Slater & Watson lamp, and which we will see in the Brush lamp, yet to come before us.

Figures 19 and 20 represent two lamps which were invented for the one purpose, at least, of avoiding the use of regulating mechanism, the great bug-bear of past times. They have both been called "semi-incandescent lamps," that is to say, they have some of the properties of the arc lamp and some of the incandescent lamp.

Fig. 19 is the Werdermann lamp in diagram. A is a comparatively large mass of carbon in connection with the negative pole of the source of electricity, and B is a thin pencil of carbon in connection with the positive pole. The carbon B is caused to press lightly against the other, and to rise as fast as consumed. The light is formed at the point of contact, and is due to the current passing through the high resistance at that point of imperfect contact.

Fig. 20 represents the principle of the Reynier lamp. A is a disc of carbon mounted on a central axis; and B is a thin pencil of carbon which rests on the periphery of the disc at an angle approaching a tangent

The idea is that the downward movement of the pencil, due to the combustion at point of contact, will rotate the

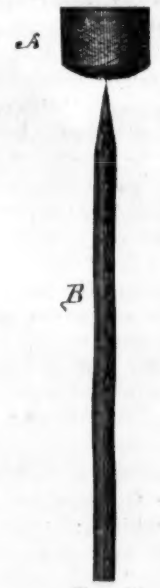


FIG. 19.

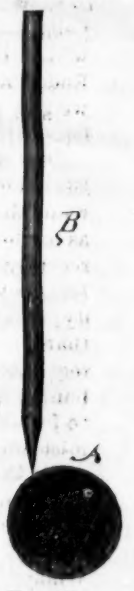


FIG. 20.

disc very slowly so as to continually present a new surface or point of contact.

[TO BE CONTINUED].

Postal Telegraph Schemes.

A special despatch from Washington to the Boston *Advertiser* says: "Senator Hill, Chairman of the Committee on Post-Offices and Post Roads, expects that the sub-committee, which has in charge the subject of a postal telegraph, will report a bill within a week or two. This will be promptly reported to the Senate, and will, he believes, be taken from the calendar at an early day and passed. Mr. Hill is not certain just what features the bill will contain, but it will certainly embody the general ideas expressed in the bills on that subject which have been already introduced. While the sub-committee is at work, the full committee will continue its inquiries. The recent speech of Mr. Hill contained several statements, based on reliable information, not at all favorable to the present telegraph system. On these points he desires to examine Dr. Norvin Green, Mr. Van Horne and other officials under oath, and the committee is likely to request their presence this week. With regard to the chances of the bill in the House there is a difference of opinion. The telegraph people claim to be confident that it will be defeated there, while Mr. Hill and others think it will pass. The principal objection to the bill, Mr. Hill says, is that it would be a dangerous centralization of power, and would increase the number of federal office-holders. To meet this the argument is used that no centralization of power in the government could be so dangerous to the people as the centralization, as at present, of power in the hands of Jay Gould. The supervision and censorship over dispatches exist now, it is asserted, and might be removed or improved by a change of control, and the skilled labor required in the telegraph service would prevent changes for political reasons."

A meeting of members of the commercial exchanges of this city was held on the 19th, at Delmonico's, to discuss measures for saving the Adirondack forests from the woodman's axe, and thus preserve the water supply of the State. The advocates of postal telegraphy seized the opportunity, however, and put up Mr. Charles A. Sumner, the California Congressman, who harangued on that subject, and stated that for $25,000,000 the government could put a wire into every post-office in the United States.

REVIEWS OF NEW BOOKS.

ELECTRICITY, MAGNETISM AND ELECTRICAL TELEGRAPHY: A Practical Guide and Hand Book of General Information for Electrical Students, Operators and Inspectors. By Thomas D. Lockwood. D. Van Nostrand, New York, 1883.

During the years 1880 to 1882 Mr. Lockwood wrote a series of Notes and Queries, chiefly relating to the practical working of the telegraph, which were published in *The Operator*, and were at the time highly appreciated. Since then many requests have been made to have these questions and answers rearranged and printed in book form. In compliance with such requests the above book has been published.

The book opens, as the majority of works of this character do, with a chapter on frictional electricity, followed by one on Voltaic electricity. Mr. Lockwood, however, departs from the beaten track in many ways in his treatment of this portion of his subject, and his illustrations and analogies are in several cases very apt; for example, where he shows the difference, with regard to quantity and potential, that exists between these two kinds of electricity (page 22), namely, by comparing the one to the heat contained in a red-hot iron, and the other to that in a tub of hot water.

These chapters are followed by others on thermo-electricity, earth currents and batteries, subterranean and submarine conductors, magnetism, magneto-electricity, induction coils and telegraphy, the telephone, etc., all treated in a manner which will be very acceptable to students and beginners generally.

Besides the chapters already enumerated the book contains descriptions of many other applications of electricity, such as Blasting by Electricity, Electric Clocks, Electric Bells, Electric Metallurgy Electric Lighting, etc., and closes with a collection of electrical notes entitled "Odds and Ends," and the usual series of tables showing the relative weight, resistance and conductivity of different metals, liquids, the electro-motive force of batteries in volts, etc.

As is well known to many of the present readers of THE ELECTRICAL WORLD who read the "Notes and Queries" while they were running through *The Operator*, and also as might be expected by those who have read the author's recently published book on "Electrical Measurements," Mr. Lockwood treats the subjects pertaining to electricity, telegraphy and telephony in a manner which shows that he is perfectly at home with them. It is to be regretted, however, that he went out of his domain to handle subjects with which, it would appear, he is not so familiar, and in dealing with which he has made some misleading and erroneous statements.

For instance, on page 72, question 73, he says, in speaking of the construction of the Gramme and other ring-armature dynamo-electric machines: "The Gramme, Brush, Wallace-Farmer, and all machines using the ring armature, have," etc. This would lead one to infer that the Wallace-Farmer machine is of the Gramme ring type, whereas the *ring* portion in this machine is not absolutely essential to its working, as it is in the Gramme machine. The Wallace-Farmer is a machine of the Niaudet type, and of the Lontin type, and practically considered, the ring portion is merely a device for holding the sections and their cores.

On page 74 is the rather dogmatic assertion: "It may be noted that the collection of metal plates ranged around the axis and forming the coil terminals, is frequently but erroneously called the commutator."

We could wish that the author had explained on what grounds he proposes to ostracise the universally accepted term commutator, as applied to these machines. The word commutator comes from the Latin, "to change," and by a commutator we understand "a device whose purpose is to change the course or connections of a circuit or portion thereof." Every electrician knows that if the sections on a ring armature were not "commutated" at the right moment they would deliver alternate currents to the external circuit. The office of this device, considered as a whole, is merely to bring about a change of connection of each section of the armature with respect to the external circuit, and therefore the "collection" can be nothing else but a commutator. It is true that the circuit is never interrupted, as by the old form of commutator, but it does not follow that commutation is not accomplished.

In Mr. Lockwood's description of the manner in which dynamo-electric machines are arranged to run as motors, page 336, question 293, he states, in speaking of the percentage of the original power of the generator that is reclaimed from the motor, "Practically this percentage is higher than can ordinarily be expected; for inasmuch as the armatures of all magnets or dynamo-electric machines generate currents when rotated, there can be no exception in this case, and as soon as the armature of the second machine commences to revolve it sets up a current opposite in direction, and, consequently, tending to weaken the original current and to reduce its power on the second armature materially."

The author is, it would seem, unaware of the fact that the efficiency of a motor used for the transmission of power depends upon this very fact, that it produces a counter electro-motive force. The efficiency is indeed the ratio between the electro-motive force of the motor and that of the generator, and the higher the electro-motive force of the motor the greater the efficiency. Theoretically we may obtain as much as ninety per cent. It is all a question of what size the generator and motor are, and what effective duty will be required of the motor. The author has also omitted to point out the difference between electrical efficiency and absolute efficiency. There is here a coefficient of loss, depending on the imperfections of the machines at both ends, and which has an important influence on the absolute efficiency.

There occurs on page 95 the following: "Thus, if speaking of a given circuit, we say that it has a current of fifty ampères, and we know that the resistance of the circuit is fifty Ohms, we know at once that the E. M. F. must be fifty volts." As a matter of fact the E. M. F. in such a case would be twenty-five hundred volts.

There has also been worked into the book a considerable amount of matter concerning line construction, office wires, fittings, etc., which has appeared in almost every book on practical telegraphy for the past fifteen years, and which, we think, might have been omitted from this one with benefit to the book as a whole.

One naturally expects in a work just issued, wherein it is indicated that various instruments or systems are described, to find in such cases the latest improvements in these instruments or systems fully explained. Indeed, it is on this supposition that new publications are presumed to be more valuable than older ones. This expectation is not quite realized in one or two instances in this work. For example, the quadruplex system, which is so interesting a subject to telegraphists at present, is only briefly referred to and that principally in the nature of a running history of its development since 1874. The most important feature of this system, namely, the manner of its operation where dynamo machine currents are used, is dismissed with a few words.

Notwithstanding these few strictures, which as reviewers we are in duty bound to our readers to make, this latest work of Mr. Lockwood will be in many respects, as we have already intimated, a valuable book to those for whom it is intended, namely, electrical students, telegraphists and others, as it gives much useful electrical information in a comprehensive manner. Its worth would have been enhanced, however, if the author had confined himself to fewer subjects, leaving to others the explaining of principles with which he shows himself more or less unfamiliar. The size of the book might thus have been considerably reduced, while its value would have been increased. Nevertheless, when these errors of fact and statement which we have pointed out—with, perhaps, other inaccuracies overlooked by us—shall have been corrected, as they doubtless will be in future editions of the book, it will deservedly become a very desirable addition to the list of elementary books on electrical subjects. * *

Telegraph Litigations.

The suit of the Western Union Telegraph Company, involving the ownership of the entire line of telegraph between Baltimore and Wheeling, along the line of the Baltimore & Ohio Railroad, was begun in the United States Circuit Court, Baltimore, on the 15th inst., before Chief Justice Waite, Judge Bond, of the United States Circuit, and Judge Morris, of the United States District Court. The suit was instituted several years ago, and has now come to trial. Gen. Wager Swayne, of New York, and ex-Attorney-General Gwinn, of Maryland, appear as counsel for the Western Union, and W. F. Frick and J. K. Cowen for the Baltimore & Ohio. Mr. Gwinn opened the case, reading the bill, and following with his argument. The case will occupy several days.

Persons who assumed to speak by authority started a report in Wall street last Friday that Mr. Vanderbilt had taken steps to prevent the consummation of the sale of the Nickel Plate Telegraph line to the Baltimore & Ohio Telegraph Company. This line forms part of the National Telegraph line, which was recently sold by the Seney syndicate to Mr. Garrett. Mr. Vanderbilt, it was alleged, claims the line under the Nickel Plate mortgage. Mr. D. H. Bates, President of the Baltimore & Ohio Company, on being interviewed, said with reference to the report: "I have received no notice from Mr. Vanderbilt or any other party regarding any claim upon the Nickel Plate line of telegraph. The line in question is the property of the National Telegraph Company, and it is too big a thing to be carried off without the fact being discovered. If Mr. Vanderbilt's alleged claim that the telegraph line is included in the Nickel Plate mortgage should prove to be good, the Western Union Company would own very little property. Most of the lines of that company are upon railroads, and the largest and most important of them were built and are being operated under railroad contracts. Those contracts are similar to the one between the Nickel Plate Railroad and the National Telegraph Company. The latter contract was prepared by Gen. Anson Stager, late Vice-President of the Western Union, for his friends, who built the line individually, and is almost a verbatim copy of the Western Union contract with the Wabash Railroad Company, which was declared by Justice Harlan to be a valid contract, except as to its exclusive character."

The officers of the Baltimore & Ohio Telegraph Company and the National Telegraph Company were, however, served on Saturday with an injunction order, signed by a judge of the Supreme Court in this city. The injunction is temporary, pending a hearing to be held on the 26th inst. The order is issued at the suit of the Western Union Telegraph Company, and restrains the two telegraph companies named from operating the lines along the line of the New York, West Shore & Buffalo Railway Company. The Western Union company claims to have a contract signed on January 7, 1880, with the Jersey City & Albany Railway Company, a predecessor of the West Shore Railway Company, by which the Western Union company is given control of the telegraph lines in question. Under the recent purchase by the Baltimore & Ohio of the property of the National Telegraph Company the wires and poles of this company, which extend along the tracks of the West Shore and Nickel Plate railways, passed under the control of Mr. Garrett's company.

"This suit," said Mr. E. A. Leslie, Superintendent of the National Telegraph Company, on Saturday, "is merely a futile attempt on the part of the Western Union to prevent us from carrying out the sale of the National property to the Baltimore & Ohio. I never heard the old contract with the Western Union alluded to, and do not believe it exists. The Baltimore & Ohio is building up a formidable competition with the Western Union. We already have two lines to the West by the Baltimore & Ohio Railway and by the Nickel Plate Railway, and we can afford to stay right here and beat the old monopoly on its own ground by doing business as cheaply as, if not cheaper than, the Western Union can. This suit is brought merely for the purpose of annoying us. The National Telegraph Company can give a clear title to the purchasing company—the Baltimore & Ohio; and there is no legal reason for interfering with the transfer."

"Will the injunction hamper the Baltimore & Ohio in handling telegraphic business?"

"Not at all. It restrains the Baltimore & Ohio temporarily from operating the lines along the West Shore Railway, and the railway company from permitting it to construct or operate any lines of telegraph. But the Baltimore & Ohio was not yet ready to open its newly-purchased lines along the West Shore and Nickel Plate, and there is nothing to prevent it from going ahead with arrangements to open these new offices in a short time, according to the original arrangement."

"When was it contemplated to open the new offices?"

"In less than a month. Meantime we shall continue to do business as usual by way of the Baltimore & Ohio Railroad wires. You can say that the attempt of the Western Union to destroy the Baltimore & Ohio, as the great monoply has so often done in the past whenever a rival company dared to enter the telegraphic field, will be sure to fail."

A dispatch of Feb. 19 from Cleveland, O, says: Judge Baxter, in the United States District Court to-day, granted a temporary injunction in the suit of the National Telegraph Company against the New York, Chicago & St. Louis Railroad Company. The plaintiffs aver in their petition that on July 8, 1882, the railway company made a contract with George J. McGourkey, whereby telegraph lines were to be constructed along the line of the railway from Buffalo to Chicago. One of the express terms of the contract was that McGourkey might dispose of his share of the lines to whatever person or corporation he chose. After the construction of the telegraph lines, McGourkey sold his interest in them to the National Telegraph Company, who are plaintiffs in this action. The telegraph company claim that the railway company deny them the right to use these wires as per contract. They stated that directions had even been given by the railway company to their employés to restrain them from using the wires. The plaintiffs, therefore, asked a temporary injunction against this restraint till a final hearing of the case, at which the plaintiffs ask that a perpetual injunction be granted.

The wires in question, from Buffalo to Chicago, form a complete circuit of the National Telegraph Company from New York to Chicago. Judge Baxter set March 10 as the date for the hearing of the motion for a perpetual injunction. The action for injunction was brought in behalf of the Baltimore & Ohio Telegraph Company, which has secured control of the National lines.

Electric Light Towers.

The following figures with regard to the use of towers for electric lighting in the West and South, are interesting:

Cities.	No. towers.	Feet high.
Aurora, Ill	3	150
Aurora, Ill	3	50
Fargo, D. T	1	150
Denver, Colo	6	150
Fairfield, Iowa	1	175
Topeka, Kan	1	150
Fond du Lac, Wis	5	150
Bay City, Mich	1	220
Rock Island, Ill	11	125
Macon, Ga	5	100
Macon, Ga	3	50
Macon, Ga	1	150
Savannah, Ga	3	150
Evansville, Ind	10	150
Elgin, Ill	6	125
Elgin, Ill	1	150

THE NEW FRENCH SOCIETY ORGANIZED.—The Société des Electriciens has completed its arrangements, and has been divided into six sections: Theoretical electricity, M. Marie Davy, president; dynamo-electrical machinery, transmission of force to a distance, distribution of energy, M. Tresca, president; electric lighting, M. Du Moncel president; telegraphy and telephony, M. Blavier president; electro-chemistry and electrotherapy, M. Jamin president. The death of M. Du Moncel creates a vacancy.

THE TELEGRAPH.

IN CHILI.—The Government of Chili has determined to unite the postal and telegraph systems of the Republic.

A SCHOOL TAX.—One of the legislators at Albany proposes to levy a tax on telegraph, telephone and pipe-line companies in this State for school purposes, through town assessors.

UNDERGROUND WIRES IN FRANCE.—It is reported that the French Government is about to lay a further length of 4,530 miles of underground telegraph wires, the cost of which will be about $11,000,000.

LATEST, BUT NOT LAST.—The International & Eastern Telegraph Company, with a capital of $5,000,000, was incorporated at Albany, N. Y., on the 18th inst. DeWitt C. Wykes, J. G. Johnston and Arthur H. Walker are the trustees.

REFUSING ANOTHER COMPANY'S BUSINESS.—It is stated that the manager of the Bankers and Merchants' Telegraph Company has ordered its offices to refuse business for points on the B & O. line except Cincinnati and Chicago, the Western wires being damaged by floods.

THE CIVILIZING CABLE.—President Grévy has received a telegram from the King of Anam. The King expresses the hope that the newly completed cable connecting Hiaphong with Thuanan and Saigon will strengthen the friendly relations existing between France and Anam.

A CHARTER GRANTED.—A dispatch from Harrisburg, Pa., of the 14th, says: A charter was granted to the Postal Telegraph and Cable Company of Philadelphia; capital, $20,000. The line is to run from Limestone, N. Y., to a point in Hanover Township, Washington County, Pa.

OUT OF THE WAY OF STORMS.—In the January gales in France and Germany the only telegraphic communication left at one time over important lines was by means of buried wires. It is true the gale was of very unusual violence, but the popularity of the underground system was much increased.

DIVIDEND.—At the regular quarterly meeting of the Board of Directors of the Mutual District Messenger Co. of Boston, held at 47 Devonshire street, that city, on Feb. 12, a dividend of $2 per share was declared, payable March 1. The net earnings for the quarter were $5,399.91, or over 11 per cent. on the capital.

THE BENNETT-MACKAY CABLES IN CANADA.—A dispatch from Ottawa, Can., of Feb. 15, states that the Bennett-Mackay Cable Company's bill was passed on that day by the special committee to which it was referred. Objection was taken to the extensive powers asked by the company to build new lines and amalgamate with existing lines. Amendments were made confining the company simply to the laying of cables and the constructing of land lines sufficient to enable them to make the necessary connections with the existing system.

A LARGE MORTGAGE.—The Bankers & Merchants' Telegraph Co. are proceeding with the registration of their large mortgage in Massachusetts. A dispatch from Taunton, Mass., of the 16th, says: "The largest mortgage ever recorded in Bristol County was received yesterday at the office of the Register of Deeds. It is for $10,000,000, and is from the Bankers & Merchants' Telegraph Co. to the Farmers Loan and Trust Co. of New York. It covers all the lines and franchises of the telegraph company in the United States. The lines of the company run through this county, hence the recording of the mortgage here."

TO MAKE WAR ON THE "BUCKET SHOPS."—Many of the members of the New York Stock Exchange have long been opposed to the methods of doing business employed by the so-called "bucket shops" which are scattered about in the vicinity of Wall street. Secretary George W. Ely has prepared a list of the establishments known as "bucket shops" which have "tickers" belonging to the Gold and Stock Telegraph Company. An effort will be made to have the company remove these "tickers." The Committee of Arrangements of the Stock Exchange now have under consideration the matter of abating the "bucket shop" business, and will probably take some definite action soon. Secretary Ely said lately: "The Exchange certainly proposes to control hereafter the dissemination of quotations from its own trading room."

OBJECTING TO A POLICY OF PLUNDER.—Henry Day, executor of the estate of the late ex-Gov. Edwin D. Morgan, made an argument before the Senate Committee on Post Offices and Post Roads, at Washington, D. C., on Feb. 14, in behalf of the Morgan estate. Twenty thousand shares of the Western Union stock formed a part of the estate. Mr. Day opposed the postal telegraph projects on the ground of injury and injustice to people who had invested in the stock of the existing companies. "If," he said, "this measure is a necessity, then it should be carried out in a manner so as to do no injustice to present owners of telegraph stock. The telegraph property in the country should be taken under the right of eminent domain and paid for at the fair market and commercial value of the same. It would be grossly unjust to take advantage of all the improvements which the telegraph companies have developed at great cost in years past in building cheap lines between great centres, and leave the feeble and unprofitable lines to the present companies, and to bear the risk and burden of all enterprises and improvements heretofore undertaken."

AN ATLANTIC SEABOARD LINE.—The Philadelphia and Seaboard Telegraph Company, which has its main office at No. 221 Federal street, Camden, N. J., has received a certificate of organization from Secretary of State Kelsey, of New Jersey. The object of the company is stated to be the establishment of telegraph lines throughout the United States, the trunk line running from Washington to Boston with an underground and subaqueous cable. On February 28th the company intend to commence laying a cable between Philadelphia and Mt. Holly, which will be pushed seaward as rapidly as possible and in water courses wherever practicable. The line is expected to include Cape May, Atlantic City, Trenton and New York early in the summer. The right of way is now being secured. George B. Pennock is President and General Manager, and M. Cowperthwaite Secretary and Treasurer. Charles M. Burns, of Philadelphia; J. Edward Conover, of Jamesburg, N. J.; M. Pennock and M. Cowperthwaite, are the Directors. The cable, which contains copper conductors, is so heavily insulated that a bunch of wires have, it is stated, been working perfectly under water for weeks without any exterior covering. It will weigh 1000 pounds per mile. The rate for messages between the two great cities named and the seaside will be but ten cents for ten words, while there will be a comparatively great reduction in night messages. The line between Philadelphia and Camden will be completed by March 1, while New York will be reached by May 1.

THAT BIG MORTGAGE.—With regard to the Bankers and Merchants' Co.'s large mortgage, the following dispatch comes from Hartford, Conn., Feb. 18: The registration of a $10,000,000 mortgage in the offices of 40 different town clerks, in direct line across the State, has awakened considerable interest from the unusual magnitude of the sum named, and the fact that an instrument representing so large an amount takes the form of a chattel mortgage. The mortgage in question is made by the Bankers' and Merchants' Telegraph Company, who, though possessing no lines of their own in this State, thus cover the lines of the American Rapid Telegraph Company, recently acquired by them by the exchange of $3,000,000 in their bonds, based on this mortgage. Hitherto the general supposition has been that bonds on telegraph lines resembled railway bonds, in that they were based on realty, and registered only in county seats; but as real estate is not an essential element to telegraph construction, except a hole in the ground may be so regarded, the only thing to be included is personal property, such as wires, poles, insulators, and instruments, all of which can only be covered by a chattel mortgage, which, in this State, must be registered in every town. In other States mortgages of this character expire in twelve months, and if not renewed expose the property on which the bond is based to execution for debts incurred. In this State chattel mortgages are permanent, but the law makes this important provision regarding this class of property, that chattel mortgages are of no force against creditors or subsequent purchasers unless the mortgaged property is put into actual and continued possession of the mortgagee. These facts are exciting considerable interest among business men.

THE TELEPHONE.

THE AMERICAN PORTABLE TELEPHONE COMPANY.—The officers of this company are actively getting things in shape, and they will be ready for business by the beginning of next week. The executive office is located at 108 Temple Court Building, Beekman street, where Mr. C. H. Sewall, the Secretary and Treasurer, will be glad to furnish a prospectus of the company. A prospectus will also be forwarded by mail to any address on application. Captain Beecher, the general manager of the company, leaves early next week on an extended trip West in the interests of the company.

AROUND SALT LAKE.—Mr. C. F. Annett, General Manager of the Rocky Mountain Bell Telephone Company, who is in town for a few days, says the Salt Lake *Herald*, states that there are good prospects for Provo, American Fork and other intermediate towns being connected with Salt Lake by telephone in the very near future, providing the citizens of these respective places show commendable enterprise and give desirable encouragement to the scheme. With the well established reputation for enterprise that Provo enjoys it is hardly probable that her ambitious people will allow so progressive a measure to perish. The telephone company is to be congratulated on its energetic branching out so extensively.

SUPERIOR TO ANYTHING YET HEARD.—W. A. Croffut tells about a new telephone just in process of being patented, of which he says: "I have tested this new telephone, and I can affirm that it is as superior to any other I have ever seen as the ordinary telephone is superior to a line drawn between two tomato cans. A whisper can be understood, though uttered miles away. Speech in the ordinary voice is intelligible when the speaker is ten feet from the transmitter. The voice seems to be directly in the receiver close to the listener's ear. Its utterances are loud and clear. Induction is wholly prevented. There is no spluttering and no little losses. And, with all this, it is twice as cheap and simple as the telephones now in use. The sweeping Bell patents may delay this, but it is so superior to anything else that I have ever heard try to speak that the adoption of the principle on which it acts cannot be long prevented."

THE TELEPHONE IN SOUTH AMERICA.—The agent of the Tropical American Telephone Company at Buenos Ayres writes under date of Jan. 3 that the December receipts of the United Telephone Company were $10,658.70 and the expenses $8,893.77. The present subscription list numbers a little over 1,200. Sales promise to be larger this month than on any previous one. They amount to $5,382. Gained 52 subscribers in December. Advices from Rio de Janeiro state that the Companhia de Telegraphos Urbanos has the following exchanges working: Rio de Janeiro, with 822 subscribers; Nictheroy, opposite, with 43 subscribers; Petropolis (connected by cable), 27 subscribers; Sao Paulo, with 110 subscribers; Companos, just opened, 8 subscribers; total, 1,005 subscribers. The company is in treaty for the establishment of exchanges in four other large cities, under a guarantee of 600 subscribers at the start. The latter half of 1883 was a period of unusual activity in telephone affairs in Brazil, but 1884 has opened with still better prospects. Both of the above companies are sub-companies of the Tropical, in which the Tropical has a stock interest, beside sending them about 150 sets of instruments per month.

UNDERGROUND WIRES DISCUSSED AT ALBANY.—At a hearing before the Senate Committee on Miscellaneous Corporations, at Albany, N. Y., on Feb. 19, on Senator Daly's bill for underground wires, Mr. Beardsley, representing the telephone companies in the various towns between New York City and Albany, stated that it was utterly impossible to work telephone wires under ground; that the National Bell Telephone Co. are seeking for and would adopt any system by which telephonic sounds could be successfully conveyed under ground, and that the passage of the proposed bill would ruin the telephone companies and prevent their giving cheap service to the public. Mr. Burton W. Harrison appeared for the Metropolitan Telegraph and Telephone Co., and denounced the bill, its author, and its motives, stigmatizing the bill as dishonest and its author's arguments in support of it as buncombe, sham and wind. He declared underground telephones in New York City to be impossible; that the telephone companies had tried every known cable, both aerial and underground, and find all impracticable on account of induction and retardation, and that no underground cable would work successfully for a greater distance than one-half mile for telephonic purposes. Mr. D. S. Robeson appeared on behalf of the Standard Underground Cable Co., of Pittsburgh, and stated that a line of underground cable had been in successful operation in Pittsburgh for the past twenty months; also that a line of the Waring Underground Cable, connecting the White House and the Capitol in Washington, and another line used by the Fire-Alarm Telegraph of Washington have been in successful operation since November last. Documentary evidence from the Government and corporate superintendents operating the above-named lines was offered in support of the statements. The hearing was adjourned to Tuesday next, when the electricians for and against the underground system will be further heard.

THE ELECTRIC LIGHT.

FAR-REACHING BEAMS.—The electric lights at Los Angeles, say the California papers, can be seen at San Clemente, eighty miles away.

TOWERS FOR HAVERHILL, MASS.—A movement is on foot for lighting the city of Haverhill from towers with electric lights. A tower 100 feet high on Hotel Webster, having six lights, will be used to test the practicability of the project.

UNDERGROUND WIRES IN WASHINGTON.—An application from the U. S. Electric Light Co., to lay underground wires in Pennsylvania avenue and Seventh street, Washington, as far as the Patent Office, is now pending before the Commissioners for the District of Columbia

THE VAN DEPOELE SYSTEM.—It is stated that the Van Depoele Company of Chicago has now extensive electric lighting plants at Lansing, Mich.; Winona, Moorehead, and Crookston, Minn.; Warsaw, Wis.; Bloomington, Sterling, Dixon, Rockford, Freeport and Elgin, Ill.; Burlington, Cedar Rapids and Decorah, Iowa; and in other Western towns and cities. At Chicago, 65 of the lights have been used by J. V. Farwell & Co., who have given an order for 250 more. The light is also used in the same city by other firms, and by the exhibitors of the large panorama of the battle of Gettysburg.

AN ACCIDENT AT BALTIMORE.—The dangers of the electric wire were illustrated, says the *Evening Post*, at a place of amusement in Baltimore the other evening. Mr. D. U. Murray, a well-known business man, was leaving the Atlantic Garden when he tried to brush aside with his hand what appeared to be a small rope dangling in front of the entrance. The "small rope" happened to be the wire of the electric light at the entrance, which had been carelessly left hanging by employés who were repairing the lamp. Mr. Murray received a shock that prostrated him and rendered him insensible for a time. On his recovery it was discovered that his hand was severely injured, the flesh being burnt through to the bone in one place.

THE LATE FIRE AT ROCHESTER, N. Y.—Writing with regard to the late fire at the Brush Electric Light Co.'s station, Rochester, N. Y., Mr. George A. Redman, the superintendent, says: "We were not as unfortunate as was at first stated. We lost but one 60-light machine, which was used in our old shop on top of the bluff. The fire communicated from another shop; our trunk lines passed between the two buildings. We had three circuits again in operation before the fire was out. Our new shop is situated at the bottom of a bluff on the brink of the Lower Genesee Falls, and we now have four No. 7 and eleven No. 8 machines, and are running nearly 500 lights. We own 2,700 horse-power turbine wheels, three Leffel and two Victor wheels. The wheel pit is 94 feet deep cut through solid rock."

A GOOD CANADIAN OUTLOOK.—Dr. J. G. Graves, of Nashua, N. H., a prominent capitalist of that city, is also one of the directors of the American Electric and Illuminating Company, says the Boston *Traveller*, and as such passed last week in Montreal investigating the business and inspecting the plant recently purchased by the company in that city, and now constituting the Canadian branch. He stated that his best anticipations were more than realized in the value of the purchase. "Why," said he, "if the American company should never do another dollar's worth of business in this country, its Canadian business would pay it a profit of $100,000 a year. The purchase includes not only the lighting business already established, a fine factory fully equipped with the very best machinery for the manufacture of dynamos, lamps, etc., and a large quantity of manufactured material, but also the sole right to make and use the Thomson-Houston system in the entire Dominion of Canada, the patents of Messrs. Thomson and Houston for the Dominion and the sole right to all their inventions for the next five years." No wonder the doctor is enthusiastic, and no wonder the public are seeking the stock at the advanced prices of the past ten days.

THE BAXTER LAMP AT JERSEY CITY.—The New York, Lake Erie & Western Railroad Company have done away with the cause of frequent and well-merited complaint by the introduction of six electric lights at the ferry buildings at the foot of Pavonia avenue, Jersey City, N. J. The work was done under the direction of Lewis F. Lyne, M. E., who is now in full control of the Jersey City Electric Light Company, as the rejuvenated Baxter Company is now known. The lights have been admirably located, so as to give the best effect. One has been placed between the depot and the ferry building, and throws a cheering light over the entire passage and the long cavern-like approach to the depot proper; another is placed outside the buildings in the centre of the main arch, thus lighting up the horse-car terminus and the front of the superintendent's office. The four remaining are inside, one being placed in centre of the waiting room, while three are utilized to light up the bridges, one being placed over each. The new departure has displaced the Pintsch gas system, which has been thoroughly tried and found wanting, in this instance at least. The new lights are working nicely, and are nightly made the subject of approving comment by those using the popular Erie route. The probabilities are that the entire depot will be speedily lighted by similar means.—*Ex.*

MISCELLANEOUS NOTES.

THE TRAINING OF WORKMEN.—A "Syndical Chamber of Electrical Workmen" has been formed in Paris to promote the technical training of the artisans engaged in what may be termed the electrical branches of industry.

THEY WANT THE SUMNER BILL.—Petitions are being circulated for signature in California, requesting the U. S. Senate and the House of Representatives to pass, without amendment or alteration, Mr. Sumner's bill for postal telegraphs.

NEW YORK ELECTRICAL SOCIETY.—The meeting of the New York Electrical Society, which was to have been held Wednesday, Feb. 20, was omitted. The annual election of officers will take place at the next regular meeting, Wednesday, March 5.

"THE ELECTRIC LIGHT."—This is the name of a new electrical paper issued weekly in Boston by the Electrical Publishing Co., and edited by W. L. Marvin. It is at present eight pages, quarto, in size, is beautifully printed, and contains a great variety of electrical news and information.

POWER AND MOTION BY ELECTRICITY.—The certificate of incorporation of the American Electric Transportation Company was filed in the County Clerk's office, Brooklyn, last week. The company will manufacture materials for street railroads and machinery to propel cars by electricity. Its capital stock is $1,000,000, divided into 20,000 shares of $50 each. Its incorporators are Rolla E. Brewster, Brooklyn; Frank S. Davis, Memphis, Tenn., and Alfred A. Marsh, Wm. Myers and Cornelius S. Groot, New York.

STOCK QUOTATIONS.

Telegraph, telephone and electric light stocks were quoted as follows on Thursday at the Electric Manufacturing and Miscellaneous Stock Exchange, and at the Stock Exchange:

TELEGRAPH.—Am. Cable, b 57½, a 59¾; Am. R., b 50, a 65; B. & M. Co., a 125⅝; Commercial Telegram Co., a 80; Mexican, b 125, a 147; Mut. Union, b 15½, a 16¼; Postal (stock), b 8; Postal Bonds (1st, 6 per cent.), b 58, a 58.50; Postal (new company), b 15, a 18; Western Union, b 76½, a 76⅝.

TELEPHONE.—American Speaking, b 110, a 125; Currier-Telephone Bell, b 2; Colombia and Panama, b 19.87, a 20; Continental, b 12; Dolbear, b 5, a 10; Erie, b 34, a 36; Globe, b 4.50, a 20; Hudson River, b 60, a 90; Inter-Continental, b 75; Mexican, b 2.50, a 2.75; Mexican Central, a 3; Molecular, b 5, a 15; New York, a 85; New York and New Jersey, a 80; New York and Pennsylvania, b 50, a 82; Overland, b 6, a 20; People's, b 9, a 11; People's (N. E.), b 1.50; Shaw, b 10; Solenoid, a 125; Southern Bell, b 95, a 125; Southern New England, a 175; Tropical, b 1.50, a 2; West India Telegraph and Telephone, b 1.95, a 2.

The Boston *Advertiser* of the 21st says of the local market: Bell Telephone closed steady at 175, as before; Erie at 34: New England declined ¾ to 41; Mexican sold at 2 7-16.

ELECTRIC LIGHT.—American, b 4.90, a 6; Brush b 50, a 80; Brush Illuminating, b 50,a65; Daft, a 85; Edison Illuminating, a 65; Edison Isolated, b 50, a 100; Edison European, b 3, a 15; Excelsior, a 28; Fuller Electrical, b 10, a 28; Swan Incannescent, a 40; United States, a 110; United States Illuminating Company, a 95.

BUSINESS NOTICES.

OTTO FLEMMING, 1,009 Arch street, Philadelphia, Pa., makes a specialty of Faradic galvanic and cautery batteries. He has a great many varieties of surgical appliances for electro-medical specialists. Send for his catalogue.

ELECTRICAL APPARATUS AND SUPPLIES.—A. F. Fleischmann, 1226 Chestnut street, Philadelphia, has had an experience of thirteen years in the manufacture and repair of electrical apparatus, and is thus enabled to offer to the public a large, cheap and useful line of instruments, batteries, supplies, annunciators, bells, lamps, galvanometers, and the like. His illustrated catalogue gives full particulars.

THE DR. JEROME KIDDER MANUFACTURING CO., 820 Broadway, New York City, are exhibiting medals from all the leading exhibitions held in this country and abroad, awarded for the superior merit of their medical batteries. This house is the oldest in this country manufacturing these goods. See card on page iv. Send for the new circular on electro-medical appliances.

THE NOVELTY ELECTRIC COMPANY.—This company, which bought out the Penn Electrical Co. recently, is doing a very large business at the S. W. corner of Fifth and Locust streets, Philadelphia. Its catalogue and price list contains over 80 pages, and is freely illustrated. It makes a specialty of electric and magnetic instruments and supplies for amateurs and beginners, and is gaining great success in the application of electric power to illustrative models and toys. These toys are very beautiful and interesting and find a large sale everywhere.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

Edited by N. S. KEITH, Electrical Engineer and Expert, 237 Broadway, New York.

PATENTS DATED FEB. 5, 1884.

Aerial Cable; William R. Patterson, of Chicago, Ill., assignor by mesne assignments to The Western Electric Company, of same place 292,847
The suspending wire of lead-covered cables is wound in long spirals thereon, and there bound by a spirally wound tie-wire. The object is to compensate for the unequal expansions of lead-covered cables and suspending-wires due to bending on reels, etc.

Annunciator-Switch and Telephone-Circuit; Charles E. Scribner, of Chicago, Ill., assignor, by mesne assignments to the Western Electric Co., of same place..... 293,197
A switch at a subscriber's station operated by a battery at the central station for connecting the subscriber's instrument to ground to cut it out of the group.

Apparatus for Operating Electrical Devices; A. Livingston Bogart, of Jamaica, N. Y..... 292,785
This invention consists in the combination, in open-circuit electrical circuit apparatus, of a resistance consisting of a thin ribbon or wire, with devices constructed to be set in operation by the expansion of the ribbon or wire from heat imparted by the current passing through it.

Apparatus for Telephonic Transmission; Jacob F. Mehren, of Chicago, Ill..... 292,835
Puts the battery, receiver and secondary coil of the inductorium in series, divides the current equally between the transmitter and primary of the inductorium, and then joins the currents through the line to receiving station, where the current traverses like apparatus (except battery) in reversed order to ground.

Automatic Telegraph; Theodore F. Taylor, of Chicago, Ill..... 293,110
The object is to make the marks made on the chemically-prepared paper at the receiving station of an automatic telegraph circuit clearly defined. This is accomplished by combining with the usual transmitting and receiving devices an auxiliary battery having an electromotive force less than that of the transmitting battery, and of reverse polarity thereto, and two branch conductors containing artificial resistances extending to the earth from points in the main line near the transmitting and receiving terminals thereof, respectively.

Electro-Magnet and Armature; Illius Augustus Timmis and Stanley Charles Cuthbert Currie, of London, England..... 293,116
Designed to extend and equalize the attractive power of a magnet for its armature.

Circuit-Closer for Telegraph Keys; Samuel J. Spurgeon, of Houstonia, Mo..... 293,105
Means are provided whereby the circuit is automatically closed on releasing the key.

Condenser and Test Circuit for Multiple Switch Boards; Charles E. Scribner, of Chicago, Ill., assignor to the Western Electric Co., of same place..... 292,865
Consists of a condenser placed in the circuit of the different pairs of connecting cords and testing apparatus at the different boards and circuits.

Driving Gear for Magneto-Electric Machines; Ezra T. Gilliland, of Indianapolis, Ind., assignor to the Western Electric Co., of Chicago, Ill..... 293,160
The operation of rotating the driving-crank of a magneto-call automatically closes the circuit from the armature to the line.

Electric Burglar Alarm; James P. Hanson and James P. Christensen, of Chicago, Ill.....292,806, 292,807
Devices, which by the slightest contact to close a bell-alarm electric circuit. The devices are placed in show-cases, on windows or doors, or attached to curtains.

Electric Gas-Lighting Attachment for Burglar Alarms; A. Livingston Bogart, of Jamaica, N. Y., assignor to Abraham L. Bogart, of same place..... 292,786
This is an improvement in apparatus to be used with burglar-alarms for the purpose of automatically turning on and igniting one or more gas jets whenever the burglar-alarm bell is sounded or the indicator-drop falls. The lights are lighted separately and successively, the alarm sounded for a time, and then the alarm-circuit is opened, all automatically.

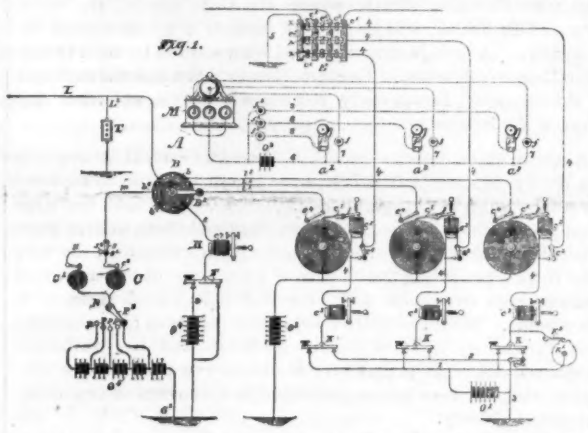
Electric Motor; Adolphe E. G. Lubke, of New York, N. Y., assignor of one-half to Otto Heikel, of Jersey City, N. J..... 292,930
Switches are provided by which to cut out, or short-circuit, portions of the coils of the field-magnets of an electric motor to vary the speed or power.

Gas and Magnetic Telephone System; James H. Rogers, of Washington, D. C., assignor to the American Electro-Gas Telephone Company, of New Jersey 292,857
Consists in combining the gas-telephone apparatus of the same inventor with a magnetic telephone system, so that the two may be operated independently, interchangeably, or conjointly.

Looping-in Mechanism and Operator's Apparatus for Telephone Exchanges; Eugene M. Wilson, of Worcester, Mass., assignor of one-half to Alice P. Carpenter, of Foxcroft, Me..... 293,206
For facilitating the work of operators.

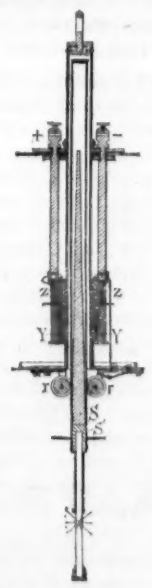
Night Signal Circuit for Telephone Exchanges; Charles E. Scribner, of Chicago, Ill., assignor by mesne assignments to the Western Electric Co., same place..... 293,192
Consists in continuing the line of any subscriber to the offices of many subscribers, thereby providing for many subscribers a means of signaling the central station.

Automatic Telegraph System; Theodore F. Taylor, of Brooklyn, N. Y..... 293,111



This is an improvement upon the well-known Leggo system, and consists in providing at a sending station a main or manager's desk with several operators' desks. The operators have each a cylinder on which to prepare messages, and upon signals to the manager they put the cylinders successively upon the line by means of a switch. *L* is the line; *B* the manager's switch by which the cylinders *D* or the receiving cylinders *C C'*, as the case may be, are put to line; *F* is the manager's key; and *K K K* are the operators' keys by which they operate the pencil. *M* is an annunciator at the manager's desk, by which he learns from the several operators that their cylinders are ready; and f^3 f^3 f^3 are call-bells by which the manager signals to each operator that his cylinder has been put to line.

Electric Lamp; Ludwig Piette and Franz Krizik, of Pilsen, Austria-Hungary..... 293,076



This is a variation of the Pilsen lamp of the same inventors. The lamp, so-called, had a long magnetized core tapering from the middle each way to the ends. This core was surrounded by two solenoids, one in the main circuit and the other in the shunt, of high resistance. By this arrangement the tendency of the core was to remain in any assumed position until there was a change in the magnetism of one or the other solenoid. In this way the use of clockwork, clamps and other detaining mechanisms was avoided. The present lamp is devised to avoid the use of two separate solenoids. In place thereof one differential solenoid is used, and the core is made tapering only one way. In the figure + and — are the binding-posts; *Z* is the solenoidal coils of the main circuit; *Y* is the like coils of the high-resistance shunt; *r r* are guide-rollers; *S* is the tapering iron-core, and *S'* is a brass tube enclosing the core and fastened to it at the lower end. The solenoid coils of each kind are made tapering, as shown by the figure.

Printing Telegraph; Henry Van Hoevenbergh, of Elizabeth, N. J..... 292,966
Static currents are neutralized by reversing the direction of current with each impulse, and novel apparatus is provided therefor.

Protector for Electric Circuits; Josiah W. Dyer, of Philadelphia, Penn..... 292,796
This instrument, put into telephone or telegraph lines, protects the ordinary instruments belonging to such lines from the destructive action of currents of high tension or great quantity produced by lightning or by dynamos. This is done by first shunting and then breaking the line circuit by the action of a magnet, which only operates its armature when affected by abnormally strong currents.

Signaling Apparatus for Telephonic and Telegraphic Circuits; Lorenzo S. Fairbanks, of Boston, Mass..... 292,999
Consists in the use at each station in the several stations in the telephonic circuit of a series of separate armatures, which are adapted to be vibrated in any suitable manner, and at different rates of vibration; but the rates of vibration of those of any one station severally corresponding to the rates of vibration of those of each of the other stations; and these armatures are arranged in relation to an electro-magnet at each station in the telephonic circuit for either of them to be readily and conveniently placed into operative position as to said electro-magnet, and when so placed as to be vibrated in any suitable manner, and to secure at the station in the telephonic circuit having an armature of a corresponding rate of vibration in operative position relative to its electro-magnet, the vibration of said armature in strict accordance therewith; and thus with the proper combination and arrangement of a bell or bells of use a signal to be sounded, while all other signals in the circuit remain at rest.

Speaking Telephone; Francis Ware, of Boston, Mass..... 292,881
A hemispherical, resonating chamber is put over the mouth-piece of the ordinary form of transmitter. The chamber is spoken into and through.

Telephone; Daniel Drawbaugh, of Eberly's Mills, Pa..... 293,154
A novel arrangement by which both poles of the magnet act upon the diaphragm of a receiver.

Telephone Apparatus; Ezra T. Gilliland, of Indianapolis, Ind., assignor to the Western Electric Co., of Chicago, Ill..... 293,161
The receiver is mounted on a pivoted arm at proper height and position. When the ear is pressed against the receiver the arm is moved thereby to make the suitable electrical connections.

Telephone Apparatus; Ezra T. Gilliland, of Indianapolis Ind., assignor to the Western Electric Co., of Chicago, Ill..... 293,162
Various in the details of a magneto-call signal apparatus, with the object of producing a more efficient and convenient instrument.

Testing Apparatus for Multiple Switch-Boards; Charles E. Scribner, of Chicago, Ill., assignor to the Western Electric Co., of same place... 292,866
Is designed to enable the operator at one board to readily determine whether the line of the subscriber called for is in use at any other switch-board.

Telephone Call-Bell Switch; Louis Townsend, of Evansville, Ind..... 293,118
The lever upon which the receiver is hung is moved to place, upon removal of the receiver, by a torsion-spring, and the switching is done thereby.

Telephone Case; Park Benjamin, of New York, N. Y..... 293,136
The telephone case is made of glass, cast, or moulded, to the size and form desired.

Telephone Circuit Changer; Charles D. Haskins, of New York, N. Y., assignor by mesne assignments to the Western Electric Co., of Chicago, Ill..... 293,171
An improvement upon the jack-knife switch.

Telephone-Switch; Charles E. Scribner, of Chicago, Ill., assignor by mesne assignments to the Western Electric Co., of same place..... 293,198
A new cut-out or spring-jack switch for facilitating the connecting of subscribers' lines.

Terminal Box for Telegraph Cables; William R. Patterson, of Chicago, Ill., assignor to the Western Electric Co., of same place.....292,848, 292,849
Improvements in boxes wherein the wires of cables are separated, and therein connected to the several aerial branch lines for telegraph and telephone service.

Voltaic Arc Lamp; Otto A. Moses, of New York, N. Y..... 292,840
A wire-brush within the tubular upper carbon-carrier is caused to expand by attraction of a surrounding solenoid against the sides of the tube, and thus act as a clamp by which the mechanism of the lamp is operated.